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93

DEWEY



WORKING PAPER
ALFRED P. SLOAN SCHOOL OF MANAGEMENT

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Change and Variation amidst Standardization

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February, 1993

WP3529-93

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Working Paper in:

**International Program for Enhanced
Nuclear Power Plant Safety**

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NUCLEAR POWER OPERATIONS AT ELECTRICITE DE FRANCE: CHANGE AND VARIATION AMIDST STANDARDIZATION

Anthony J. DiBella

The French nuclear power system, owned and operated by Electricite de France (EDF), is renown for its use of a standard technology in the production of electricity. Despite the French use of similar, if not identical, systems in its 57 plants, change is also a recurrent phenomenon. This contrast between standardized technical systems and changing organizational systems is a critical element in EDF's effort to improve operational safety and efficiency.

This essay first describes selected aspects of EDF operations which reflect the historical emphasis on standardization. A second section describes the various changes taking place at EDF which contrast with the apparent stability resulting from standardization. The reasons for these changes and their implications are discussed in the final sections.

I. ELEMENTS OF STANDARDIZATION

The key element in EDF's standardization policy is the universal use of pressurized water reactors in identically sized plants. Yet there is some variation among plants. There are also other elements of EDF's operating environment that minimize complexity and ensure consistency among industrial and organizational actors.

A. Plant Design & Redesign

In 1974, France made the decision in the midst of the Arab oil boycott to commit itself to nuclear power. At the time, EDF had seven nuclear power plants on-line producing twelve percent (12%) of France's electricity. Five plants were graphite gas cooled, one had a liquid metal, fast breeder reactor, and one had a pressurized water reactor (PWR). Four other plants, designed to use PWRs, were under construction.

After the national commitment to nuclear power was made, EDF staff decided that all subsequent plants would be PWRs. This standard design would increase economic efficiency, operational safety and reliability through the opportunity to build on the experience at identical plants. The resulting "retour d'experience" would be used as a basis for plant redesign.

Although EDF was committed to a standard type of plant, several series of identical units were built. The variation in plants was based on the need to adapt a standard design to different environmental settings (especially with regard for alternative cooling mechanisms - cooling towers, river water, and sea water) and to build in modifications identified through experience. Three series of 900 MW plants were built: CP 0 (6 plants), CP 1 & CP 2 (28 plants); and there are two series of 1,300 MW plants: P4 & P'4 (20 plants). Nine hundred MW plants have a three loop steam

supply, while 1,300 MW plants have four such loops. EDF is also constructing two N4 series units which will be 1,400 MW.

Thus, although PWR technology serves as the foundation of the EDF system, there is some limited variation between such plants. Other types of reactors also still contribute to EDF's overall production. Of the six graphite gas systems built, four have been decommissioned, and the remaining two will be closed down within the next two years. The fate of the two fast breeder reactors is uncertain pending further experience at the "Super-Phenix" 1,200 MW reactor connected to the grid in 1986. EDF's current network of nuclear plants produces 75% of France's electricity.

B. Political Will, One Company Control, & Contractor Specialization

EDF has become the world's largest producer of nuclear power. Critical to this development has been a national energy policy and the shared recognition of various political interests of the need for a successful French nuclear program (1). There has also been widespread public acceptance of nuclear power. Underlying these conditions has been the French desire for independence from foreign energy sources.

The French standardization policy benefits from the fact that EDF is responsible for all phases of nuclear power production. This includes the design, construction, and operation of all plants.

EDF has separate divisions for R & D, construction, and power generation. Placement of these diverse functions under one organization facilitates the realization of corporate policy.

EDF is not the only actor in the French nuclear industry. As one component in a unified industrial policy, EDF relies on specific companies for certain services to streamline its relations with outside suppliers. For example, Framatome designs, builds, and provides maintenance services for all EDF reactors. Alsthom builds and maintains all turbine generators. Cogema handles all fuel cycle services, such as fuel recycling and waste disposal. In France there is also a collection of companies which provide specific support services. For example, Cegelec supplies and maintains auto-electric mechanisms; Ouvaroff handles thermal insulation.

C. Human Resources

The French readily identify the technical, material, and political components of their standardization policy. Yet there are elements of the industrial structure and EDF's personnel practices that ensure commonality among the human dimension as well. Shared organizational values can be as important to efficient and safe plant operations as identical technical systems.

There are 120,000 EDF employees. Until 1992, the 25,000 employees

directly involved in electricity production from thermal sources (coal, gas, nuclear, and oil fired plants) were assembled together under SPT (Service de la Production Thermique). Just recently, the management of classical (non-nuclear) and nuclear plants was separated with the latter housed in DPN (Direction du Parc Nucleaire).

As France's monopoly producer of nuclear energy, EDF is the principal employer for engineers who want a career in this industry. EDF's diverse activities provide opportunities for human resources with specialized or general interests. A system of job rotation can accommodate an employee's desire to change work or lifestyle with minimal dislocation.

Perhaps more significant is EDF's no-firing policy. Once past an initial one year probationary period, a new employee is guaranteed lifetime employment. This policy has its roots in EDF's history as a publicly owned company created by a socialist government after WWII. The consequences are that there is little employee turnover, staff interact on the basis of personal knowledge of one another, organizational values are well-known, and employees create lifelong social ties through their job placements.

To summarize, standardization at EDF is not based on technical factors alone but is embedded in industrial and human resource contexts that simplify relationships. Some provision has also been

made to accommodate differences. There is uncertainty in EDF about how the emergence of a unified Europe in 1992 will affect standardization and the need for variation. For example, the policy requiring EDF employees to be French citizens will have to be altered which should lead to a more diverse workforce.

II. ELEMENTS OF ORGANIZATIONAL CHANGE

By the summer of 1991, EDF had established a network ("le parc") of 56 nuclear plants on-line with several 1,300 and 1,400 MW plants still under construction. While this physical infrastructure was firmly in place, the mechanisms used to manage EDF operations were undergoing several forms of change. These changes reflected both organizational and managerial processes. Some generic changes were taking place throughout "le parc". Others changes were specific to individual plants.

A. Decentralization: The Changing Relationship Between EDF Headquarters & Plant Sites

Perhaps typical of French corporations, the managers of EDF power plants have traditionally had limited authority to act independently from Paris headquarters. [The latter, once known as "Service Central" was renamed Moyens Centraux (MC) in 1992.] Standardized procedures and rigid hierarchical lines of reporting and authority minimized differences between plants. Now at EDF,

there is much talk of "decentralization" to ensure professionalism and provide employees with greater meaning in their work. This new orientation is reflected in a series of change initiatives.

1. Change in Reporting Relationship Between Plants and DPN/SC

EDF site managers are part of a formal chain of command and delegated authority between plants and DPN headquarters. The structure of this chain of command has undergone several shifts since EDF first began nuclear power operations. At one stage, lines of reporting to MC were determined by size of plant. All site managers at 900 MW plants reported to one senior manager at MC and site managers at 1,300 plants reported to another. Subsequently, reporting was based on geographic location through eight regional offices, Groupe Regionaux de Production Thermique (GRPT).

The next shift occurred when site managers at all CPNs (Centre de Production Nucleaire - sites with four or more plants) no longer reported to a GRPT but to MC directly. CPNs were considered to be more self-sufficient due to their larger size and different internal structures than CNs (Centrale Nucleaire - sites with two units). The direct line of reporting to Paris reflected the greater autonomy of CPNs, while CNs continued to report to a GRPT.

The latest shift which is just in the process of being implemented is to reduce the dependency of CN site managers to the GRPTs and have them report directly to MC as well. At DPN headquarters there are presently two Chefs de Zone, one for CPNs and one for CNs. The intention of this latest shift in the words of one zone head is to "reduce the hierarchy and make the organization flatter so that communications are speedier." All production sites, both CPNs and CNs, are now referred to as Centre Nucleaire de Production d'Electricite or CNPES. Meanwhile, to emphasize the increased independence of site staff, GRPTs, which comprised a regional form of organizational control, have been replaced by Unites de Service et d'Assistance (USA), which are regional support offices.

2. The Changing Role of Service Centrale, Now Moyens Centraux

The desire for decentralization, reflected in the shift in reporting relationships between headquarters and the plants, is tied to a changing role for DPN/MC. Previously focused on plant operations and problem solving, DPN/MC personnel are becoming increasingly more oriented toward policy development, strategic planning, and solving generic problems that arise within EDF's system of standardized plants. Greater attention is being paid to long-term issues rather than "real time" problems. Examples of this orientation are shifts in where event analysis is performed and safety procedures are prepared. Where MC was once solely responsible for these tasks, now the centrales must address these

concerns as they relate to the idiosyncrasies of their own situation.

3. Shift Primary Analysis of Events to CNPEs

In the past, principal responsibility for event analysis rested with engineering staff at MC. Now on-site engineering is expected to perform primary event analysis. DPN/MC will only analyze events which may have implications or provide lessons that should be shared throughout "le parc" or at similar type plants.

4. Safety Procedures

All plant safety procedures were once prepared in the Department of Nuclear Safety (DSN) at EDF/DPN headquarters in its La Defense offices in Paris. Now more responsibility is being given to MSQ (Mission Surete et Qualite) staff at each plant site. DSN prepares safety guidelines and technical specifications for nuclear operations, but it is the responsibility of plant MSQ staff to develop the specific procedures that will be used.

According to the head of DSN, this shift was taken to ensure greater autonomy for local staff. "The more precise we get, the more detail they want from us. To the point where staff can't act without any discretion of their own. We want them (MSQ staff on-site) to take responsibility beyond following a set of rules."

The emphasis is to preserve individual initiative and ensure that MSQ staff are motivated.

B. Transversalite

Another term that is frequently heard at EDF is "transversalite." Plant operations involve projects and tasks which are the responsibility of several departments or functional areas. For example, replacing a water filter requires the engagement of both maintenance and operating staff. The traditional functional divisions of staff make coordination difficult due to competing demands, time pressures, and different values. "Transversalite" reflects the cross-functional aspects of these relations and overlapping work operations. More emphasis is being placed on transversalite to improve communication and coordination in addressing common/shared objectives.

1. The College de Direction: Changing Responsibilities at the Top

SPT was recently managed by an "Etat Major" consisting of an executive director and several deputy directors who supervised department heads. During the last two years, the "Etat Major" group has been reconstituted and renamed the "College de Direction" (CDD). The new name reflects the shift to a senior management team which has a shared responsibility that de-emphasizes hierarchy. The design of the CDD is to provide a matrix structure that

enhances communications across departmental lines.

The CDD is now composed of the executive director, three deputy directors, two zone directors, and four chefs de mission. The four chefs de mission were created as senior level positions for technical experts who would not have line or "real time" responsibility. They serve as technical project managers to review recommendations made in their areas (human resources, MIS, safety, technology) and to recommend decisions that should be taken by the CDD.

The transition to the CDD was made to increase opportunities for participatory decision-making that bridges operational and technical-functional areas of responsibility. For example, members of the CDD direct seven different staff committees that make decisions on key activities and domains such as safety and technology. Each committee oversees the work of cross-departmental work teams or "groupe du travail" (GDT) that analyze problems and make policy recommendations. As special problems or short-term projects are identified, GDTs are formed by assigning staff from various departments and from both MC and the centrales. The aim of this process is to involve all departments in problems and issues that either impact their work or whose resolution can benefit from their direct involvement.

2. VISUREX Inspections

At EDF, safety and quality evaluations of plant operations are the responsibility of Inspection Nucleaire (IN). The purpose of such inspections or audits is to ascertain whether procedures or their application adequately meet EDF's safety objectives. Audits have traditionally been carried out by two to four DPN inspectors supported by several plant staff.

During the last two years IN, at the request of EDF's General Inspector for Nuclear Safety, has undertaken a new inspection program called VISUREX. These inspections involve teams of as many as 30 persons who focus on specific themes or areas for which there is overlapping work responsibility. VISUREX teams are composed primarily of specialists and operations staff from throughout EDF. Possible domains reviewed during an inspection include maintenance, training, and experience feedback. VISUREX is a new way to review work domains and themes that are a shared responsibility among several functional departments. Although coordinated by IN, VISUREX is not regarded by some staff as a formal inspection but as an opportunity to exchange good practices between plants.

3. Groupe Coordination du Parc

Created within the last six months to coordinate "affaires transverses," the Groupe Coordination du Parc (GCP) keeps track of all events or incidents which may have ramifications for numerous

plants. Due to the standardization of EDF's technical systems, an event at one plant is evidence that a similar problem may presently exist at other plants. Events are also regarded as precursors of problems that will eventually be duplicated elsewhere.

It has been a tradition at MC to hold an afternoon meeting every Monday for representatives from all major departments. This meeting was an opportunity for departments to share information about their activities and discuss areas of common concern. Now the Monday meeting is run by the GCP as a coordinating mechanism among MC departments. At this meeting, decisions are taken about which events during the preceding week are worthy of further analysis, whose technical area the event falls, and a timeframe for the completion of the needed analyses. Often, events fall into several areas, and the meeting is used to coordinate the input of all departments that will be involved.

C. Plant Level Changes

Besides the changes taking place in MC at La Defense, changes are also occurring at plants. Changes were noted during fieldwork conducted at two plants, Alpha and Beta (2). These organizational and managerial changes reflected the stated emphasis within DPN for decentralization and greater sensitivity to transverse (cross-functional) operations.

1. Increased Plant Autonomy

At Alpha, a CN site, decentralization is taking several forms. First is the decreased reliance on GRPT which has already begun and will be phased in over the next two years. The formal hierarchy of authority has been reduced with the Chef de Centrale no longer reporting to the nearest GRPT but to a Chef de Zone at DPN\MC. As part of this shift Alpha will soon have full responsibility for payroll, budgeting, and accounting, activities previously handled by the GRPT. Subsequently, other responsibilities, such as training, will also be transferred from the GRPT to plant staff. Meanwhile, additional engineering personnel are being added to enhance local capacity to perform event analyses. This is consistent with the changing role of engineering and MC.

A major change just initiated at Alpha is a new organizational structure. According to the Chef de Centrale (CDC), the structural redesign reflects the organizational changes that have been taking place at the higher levels. The old structure at Alpha was the same as it has been at other CNs, since the discretion to alter the structure at a CN was not previously within the purview of a CDC.

The redesign has meant not only a realignment of existing functions, but the creation of new missions, functions, and services, and the renaming or elimination of others. Equally

significant is that the graphic image of the new structure has been portrayed in a completely new format. Instead of a vertical hierarchy, the organization is now depicted as a series of concentric ovals. Appendix A shows how the transition from the old (Hier) to the new structure (Aujourd'hui) was presented to employees in the monthly employee bulletin.

Staff at Beta, which has an organization structure identical to those found at other CPNs, has also been recently given the prerogative to change the formal structure. A major difference between a CN and a CPN is that at the latter maintenance staff are assigned either to separate plants or to an independent division (Sous Unité Technique or SUT) that provides outage services to the entire site. Plans have already been made to alter the structure of the SUT so that site and plant maintenance staff work together more closely. These proposed changes have resulted from MC giving site staff more discretion over structure. Staff at Beta believe they can be more efficient if the structure is changed.

2. Control Room Staff Roles & Structure

Even as Alpha and Beta undertake and plan structural redesign, plans are also being made to alter the staffing pattern in the control room. Plant operations at Alpha is directed by a Chef de Service who is assisted by two operations engineers. The control room at each plant is run by separate watch teams led by a shift

supervisor, an assistant shift supervisor and a team of operators, technicians, and rondiers or watchmen.

Plans are presently being made to integrate the operations of the two plants together and increase the level of staff responsibility. A new position of chef d'exploitation will be created to oversee, on a shift basis, operations at both plants, including management of the control room teams. The chef de quart (shift supervisor) position will be phased out and a new position of cadre technique will be created to provide technical support at each control room. This new structure is not expected to be fully operational until 1994 since it will take several years before sufficient personnel are fully trained to occupy these new roles.

3. Permanent Planning Staff for Outages and Daily Maintenance

Among the many ways that CPNs differ from CNs is that the former has a technical division responsible for all outage work. Alpha, a CN, is changing so that it too will have a permanent structure to plan and manage outages. Additional positions dedicated to outage and maintenance planning have been created and will be based in a new unit called Service Logistique de Production.

D. Changes in Substance and Changes in Appearance

The changes described above, in organizational structure and processes, reflect substantive actions taken at EDF to reshape employee behavior and organizational performance. Coinciding with these substantive changes, a number of symbolic changes have also occurred. These changes can be seen most clearly in the renaming of staff functions. The apparent aims of this practice have been to signal a new era in EDF management and to reshape perceptions so that functions are portrayed in a manner that fits the present management philosophy.

For example, the name of EDF's headquarters offices at La Defense has been changed from "Service Central" to "Moyens Centraux". Nuclear production, once a part of a service (SPT) that included all electricity generation, is now a separate Direction (DPN). "Etat Major", the chief decision-making body over nuclear operations, has been renamed the "College Du Direction". These and other symbolic changes suggest a concerted effort to create an image that reflects a new spirit of open and coordinated management.

III. EMPLOYEES EXPLANATIONS & REASONS FOR ORGANIZATIONAL CHANGE

Change has become a ubiquitous phenomenon both in society and in organizations. According to one engineer temporarily assigned to

EDF for the last eighteen months, DPN is "always undergoing change." Yet from the perspective of a member of DPN's College de Direction the changes presently taking place are very rare. He claimed that during EDF's growth into nuclear power change involved primarily technical matters, but the most recent changes involve management and forms of communication and organization.

Given my limited exposure to EDF and the French nuclear industry, it is not feasible for me to definitively say why all these changes are taking place while others are being planned. It is also unclear whether all these changes emanate from a single or multiple source or causes. However, during my fieldwork in France, employees discussed with me a variety of their own explanations about why EDF appears to be undergoing so much change. The following section contains staff reasons for why these changes are occurring.

A. EDF's Transition from Construction to Operations Phase

From 1975 to 1990, EDF managed the construction and start-up of 51 nuclear power plants. During the last year an additional 1,300 MW plant was connected to the grid, even as construction continued at the last two 1,300 MW plants to be built. Further growth is anticipated from six 1,400 plants of which two are under presently under construction. Meanwhile, the focus of EDF staff has shifted from construction to concerns about operations and maintenance.

According to one Department Head at MC:

"During the construction phase there has been no time to think about what we should know to do things right.. ..When we started we had little time or resources to put competent people at each site. Due to the number of plants and the growth rate we could not get enough people to take initiative, so we decided to have a strong centralized engineering capacity....Now we want to do more predictive and preventive work rather than be reactive...What we realized is that you can't drive 50 plants from Paris, but it was too soon to change ."

Several EDF employees referred to this shift as the underlying cause for all the changes taking place at EDF. The technical and organizational problems of building the infrastructure for a production system based on nuclear power are seen to be different from the demands of managing "le parc." For example, reliance on several series ("palier") of identical plants demands communication and coordination mechanisms that provide experience feedback.

B. The Growing Concern for Safety

In 1989, two incidents occurred at EDF plants that raised significant concerns about safety. The first occurred in early August at Dampierre. Two plugs were found closing off ventilation lines needed in case of loss of cooling to the primary system, on both reactor buildings. The plugs had been in place for eleven months.

Later the same month at Graveline, screws on three pressurizer safety valves were found to have been left untightened following maintenance work performed during an outage in 1988. There were no real operational consequences to these discoveries but the fact that these conditions had been in place for nearly a year raised concerns about safety. How many other untightened screws or unremoved plugs remained to be discovered on various systems throughout EDF plants?

Following these incidents, the head of the then SPT initiated a two part internal process to analyze these events and examine maintenance practices. First, a study commission was formed to consider how human factors (HF) contributed to these incidents. It was led by Armand Colas, head of the HF Division, and consisted of EDF staff from MC and several plant sites. Second, a high level Groupe de Travail was formed at MC to review maintenance practices. The report of the Groupe de Travail became known as the NOC report after its leader Bernard Noc, presently DPN's Chef de Mission Surete Nucleaire in the College De Direction. The reports issued by these two groups outlined a set of EDF initiatives and priorities to improve operations. They included the need for a "safety culture," better control of work and definition of job responsibilities, increased local capacity to analyze events, and increased staff "professionalism."

At every plant, staff were required to review the implications of

the NOC report and present recommendations. Many of the changes currently underway stem from follow-up action to the NOC report. Consequently, many staff, both at Moyens Centraux and the plants, consider the two incidents in 1989 as the source of today's changes. When organizational changes are communicated to staff, references are often made to the NOC report.

C. The New Management Team at EDF & DPN

During the last few years there have been several personnel changes in EDF's top executive positions, including EDF President, EDF Director General, and DPN Chef du Service. The individuals holding these respective positions, Messieurs DeLaPorte, Bergougnoux, and Carlier are perceived by some as a new wave of management that is more in touch with France's current political and economic environment. Some EDF employees regard the incidents at Dampierre and Graveline as providing an opportunity for organizational and managerial change. From their point of view, the changes subsequent to those incidents actually stem from a shift in orientation from a reliance on technical to managerial solutions. This new orientation reflects the concerns of the new EDF management team.

D. Running a Public Sector Company Like a Private Business

EDF is a state owned utility company. During the last five years,

there has been increasing pressure on the French government to turn over to the private sector companies that have been under public control. One example in telecommunications was the sale of CFGT to Siemens. This movement reflects a change in national policy and a growing concern that publicly owned companies run more efficiently and compete in a freer market economy. Some EDF employees think that the new management team was appointed with a mandate to run the company more like a profitable business. Changes within EDF, such as employees being asked to take on more responsibility, are perceived, especially by union officials, as mechanisms to make EDF more profitable.

E. Anticipation of European Integration

Part of the apparent concern for increased profitability and safety stems from the uncertain ramifications of European economic and political integration. For example, EDF presently exports electricity to other parts of Europe. It is not yet clear what will happen to rate structures and personnel practices that may affect EDF costs and revenues. Some employees think organizational changes are being implemented to position EDF to function in a more politically open and economically competitive environment. Changes are being made to improve the efficiency of operations and to increase public awareness and acceptance of EDF's role in meeting the demand for electricity. (Further evidence of the latter are EDF's public ad campaigns.)

F. A Problem of Declining Performance or Increasing Expectations?

From 1985 to 1990, the number of unplanned outages among EDF nuclear power plants decreased from an average of 5.0 per year per plant to 2.8. The average number of significant events also decreased from 11.1 to 7.2 (3). On the other hand at all PWR units radiation exposure increased between 1985 and 1990 from 1.75 man Sieverts per plant to 2.35; and in 1985 PWR plants in aggregate operated at 82% load factor which had decreased by 1990 to 73.9% (4).

It is difficult to determine from these and other operating statistics whether EDF's performance is improving or declining in any absolute terms. Yet the NOC report alluded to the need for improved work safety and quality. No one I interviewed expressed a concern for declining performance. However, several staff expressed concern that performance standards were getting more demanding, especially with regard to the tracking of international indicators, such as those developed by WANO. These staff felt that the changes taking place at EDF were needed to ensure performance that met the ever increasing expectations of the international nuclear industry.

G. A Felt Sense of the Need for Change: A Reorientation from Technical to Human Resources

At MC and at Beta, a few staff claimed that beyond the obvious reasons for change - the need for increased safety and performance - change in EDF was something overdue. EDF's structures and orientation to technical solutions had produced a certain level of performance. They sensed that EDF had gone as far as it could on specifying and then relying on procedures to ensure safety and good performance. To further improve efficiency, new ideas have to be tried and organizational changes made to better utilize existing human resources.

H. Public Communication

In 1986 when word first leaked out of the Soviet Union about the accident at Chernobyl, French nuclear officials informed the public that it would have no impact on France. As the severity of the incident became known, there was a growing public perception that it would negatively impact French and European agriculture. The French media criticized French nuclear officials for not being more forthcoming in informing the public about the potential danger.

This incident led EDF to establish a policy of "transparence." The public is to be kept completely informed of the status of all French nuclear power operations; nothing is to be hidden. For

example, many French homes have a telecommunications system called Minitel which provides on-line access to national computer data bases. One of these data bases contains complete information on the operational status of all French nuclear power plants and the radiological situation over France.

Some staff felt that the organizational changes presently underway at EDF were mechanisms to support this policy of "transparence." This included the direct line of reporting from CNs to DPN/MC and the reduced centralized role of DPN/MC. For example, one implication is that plant MSQ staff may officially communicate directly with French government safety authorities without first going through EDF headquarters. Such changes expedite communications and enable a more rapid response to incidents when they occur.

I. Strike in the Operating Room

In 1988, EDF control room operators went on strike. The strike began at one location and quickly spread to all EDF plants. During the strike, which lasted six weeks, the plants remained open but operated at reduced power. Operators performed in response to directives from union officials rather than plant management. At Alpha, the strike occurred while an OSART team was visiting on a three week mission. Plant staff found it difficult to explain or justify the role of French unions to OSART team members,

especially those from Eastern Bloc countries. However, the reason for the strike was considered to be common: more pay for less work.

The present effort by EDF management to give plant staff more responsibility is considered, especially among operating staff and the unions, to be a response to the 1988 strike. The structural changes being planned for the operating shifts at Alpha will lead to higher pay levels for control room and other operations staff. Some staff claim that the change will reduce the overall number of shift personnel.

IV. THE IMPLICATIONS AND PROBLEMS OF ORGANIZATIONAL CHANGE AT EDF

In the past, EDF promotional materials have emphasized technical standardization. Now DPN annual reports and brochures refer to "operational restructuring," "management circles," and "safety culture." Planned change is underway. Where it will end and what impact it will have on the organization remains to be seen.

This uncertainty is shared among EDF staff who question performance attribution. For example, when asked how DPN management will know whether the changes taking place have been effective, one member of the College de Direction remarked: "We have measures of performance for production, but it will be hard to associate (changes in) them with the structural changes being made." An EDF plant manager stated that he and his staff had some ideas about how

organizational change could improve performance but "we do not have any proof about it." Finally, shift supervisors seemed skeptical about whether change in the structure of control room staff would make any difference.

At EDF, there is uncertainty over how the organization will perform in the future as a result of planned change. Yet more striking to this outside observer was the multiple streams of change and the multiple attributions for them. Although it is difficult to know whether planned change has yet or will affect performance, it is apparent that employees are interested in the changes.

Organizational and managerial changes have become topics of employee concern and a basis for increased interaction among all levels of staff. Thus in the short term, change may have taken on as much symbolic as substantive value. The engagement of staff in discussions of change can itself be an empowering activity and a way to give increased attention to the human element in nuclear operations.

However, planned organizational change cannot proceed successfully unless some hazards and obstacles are overcome. Three obstacles to organizational change at EDF will be discussed:

- * The perceived credibility of the changes;
- * The resistance to change old behaviors and EDF's organizational culture;
- * The re-focusing of staff attitudes and skills.

1. The perceived credibility of the changes.

For staff to be motivated to change, they must perceive the reasons for change as credible or legitimate, i.e. they must concur with the cause of change. If staff do not concur with the stated explanation for change, they are less apt to change their own behavior to fit the organization-wide change. As shown in this essay, EDF staff explain the changes currently underway on the basis of many different attributions. This condition creates two constraints in implementing change at EDF.

First, there is no consensus at EDF as to the root cause of change. Some staff see change as emanating from external factors (e.g. France's political and economic climate), others see the changes taking place as caused by internal factors (e.g. work deficiencies as evidenced by the problems at Dampierre and Graveline). This distinction can be a problem when staff try to design change or evaluate its impact. From different perceptions about the nature of the problems that must be addressed will emerge different ideas about needed solutions and how they should be implemented. Without carefully planning introducing change to employees, EDF may be faced with change initiatives that conflict rather than coincide.

The second problem with ambiguous knowledge about the root cause or need for change is that staff may be cynical about change outcomes and thus have little sustained interest and motivation to participate in the change process. Staff may resist change or go

along without real commitment and hope that the necessity of change will soon fade. For example, certain French unions who are not in accord with the privatization of publically owned industries may resist efforts to make EDF more profitable while working toward reform in France's political system.

2. The resistance to change old behaviors and change EDF's organizational culture.

In discussions about change, EDF personnel explained the various processes undertaken to generate shared solutions to perceived problems. Groupes de travail and permanent staff committees have studied problems, such as those identified in the NOC report, and proposed solutions which have created new functions and services. (For example, at Alpha a new Service "Logistique de Production" is being created.) The emphasis and the excitement is on the creation of new roles and structures. What appears to have been overlooked is the likely tendency of existing departments to resist altering their activities to conform to the new structures.

For example, one of the key changes at EDF is decentralization. In explaining the ramifications of this change, staff talked openly about the changes taking place at the plants that will permit site staff to take on more responsibility. There was relatively no consideration given to how departments at MC would have to let go of responsibilities that have historically been supervised under their domain. For responsibilities to be relocated to the sites may require changes in organizational assumptions about the

capability of MC versus site staff to perform critical tasks such as event analysis. During interviews, staff expressed a perception that decentralization will be constrained, because MC ("Le salon de Paris") will ultimately maintain control.

3. The re-focusing of staff attitudes and skills.

The changes discussed at EDF are based on a reorientation of staff attitudes and behaviors toward greater safety and work quality. A major constraint that EDF faces in this process is that it must alter its organizational culture and structure without making wholesale personnel changes. The policy of lifetime employment means that EDF must rely on re-orienting existing employees rather than on recruiting new employees who could more easily be socialized toward a "safety" culture.

New structures and processes will require staff not only to have new attitudes but new skills as well. Staff retraining will have to be a central component of any change process at EDF. However, that training should not merely focus on the new skills and attitudes that will have to be acquired but how old ones will have to be adapted: As site staff act more autonomously, staff at MC also will have to change.

To conclude, the challenges faced by EDF are enormous. As standards for performance become more demanding, EDF must seek ways of better utilizing its physical and human resources. Change is

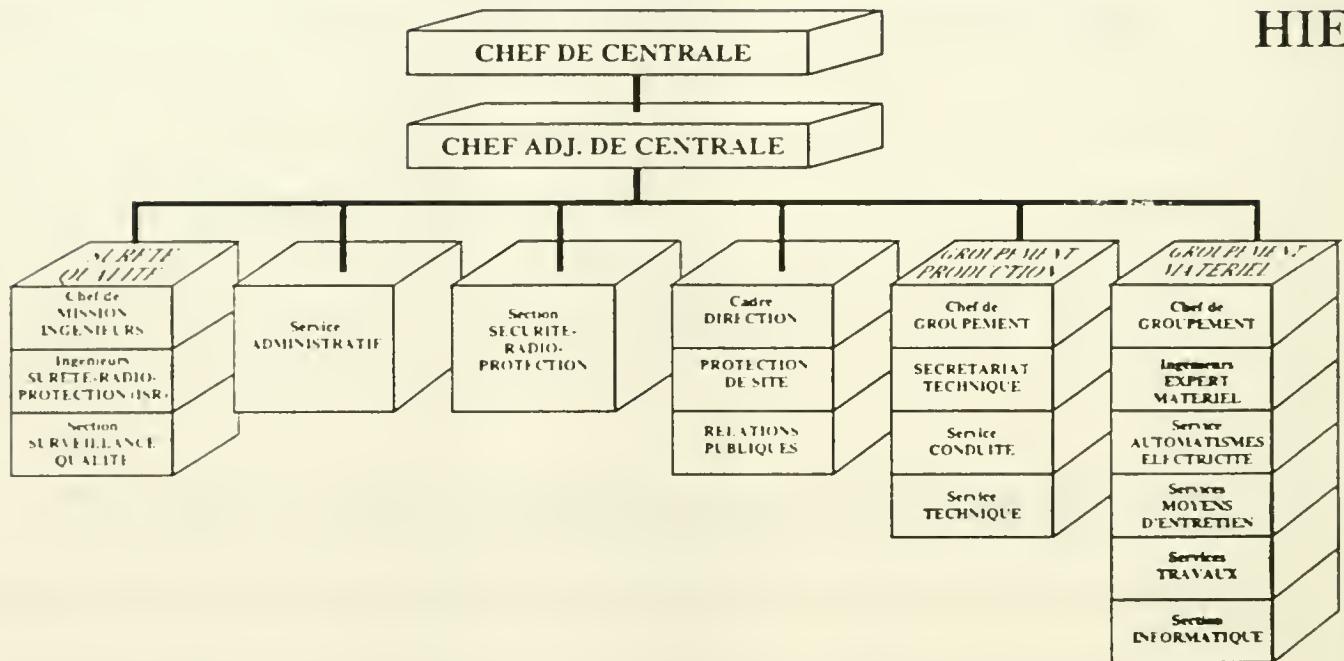
never easy, especially within a production system that is noted for its high degree of standardization. Long-term change at EDF can be achieved, but it will take coordination among the various change projects presently underway and a shared awareness of why change is needed and why it may be resisted.

NOTES

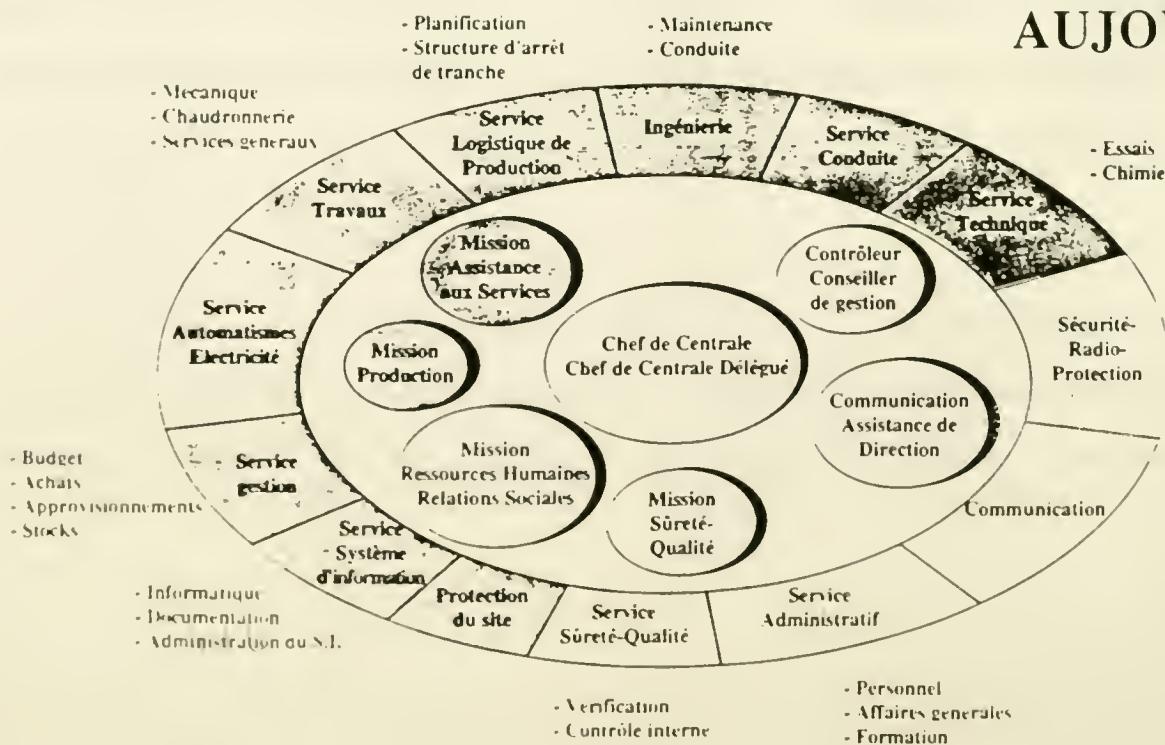
1. Giraud, Bernard; What makes a successful nuclear program? The French standardization policy. Manuscript.
2. Pseudonyms are used to ensure the confidentiality of visited sites.
3. Surete Nucleaire, 1990. Rapport de l'inspecteur general pour la surete nucleaire, page 6.
4. Data taken from Performance Indicators. EDF/SPT, June, 1991.

APPENDIX A

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